The Effects of Psychological Intervention on Recovery From Surgery and Heart Attacks: An Analysis of the Literature

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Abstract: A quantitative review of 34 controlled studies demonstrates that, on the average, surgical or coronary patients who are provided information or emotional support to help them master the medical crisis do better than patients who receive only ordinary care. A review of 13 studies that used hospital days post-surgery or post-heart attack as outcome indicators showed that on the average psychological intervention reduced hospitalization approximately two days below the control group's average of 9.92 days. Most of the interventions were modest and, in most studies, were not matched in any way to the needs of particular patients or their coping styles. Beyond the intrinsic value of offering humane and considerate care, the evidence is that psychological care can be cost-effective. (*Am J Public Health* 1982; 72:141–151.)

Introduction

Most studies of the effects of psychotherapy on utilization of medical services have considered ambulatory patients in office practices and health maintenance organizations (HMOs). However, there is also evidence that the patient's emotional status may influence the time it takes to recover from acute episodes of severe illness or from surgery. Such findings have obvious relevance for health care planning and financing.

The literature documents many ways in which psychological factors can influence health and the use of medical services, and three of these have particular relevance for patients in medical crisis: 1) emotional factors may influence the course of existing disease and recovery from medical crisis;[1–5] 2) the patient's emotional response to his/her disease may influence prescribing by the physician;[6,7] and 3) the patient's response to symptoms and to medical advice can influence the patient's subsequent management of his/her own disease.[8–12]

Impact of Emotions on Disease and Recovery

Kimball found that, of 54 adult patients admitted for open heart surgery, mortality was highest among patients who had been identified as "depressed" prior to surgery, although these patients were not at more risk on the basis of age, rating of cardiac functioning, or duration of illness.[13] Sime studied 57 women admitted for abdominal surgery and found that high levels of preoperative fear were associated with slower recovery, greater use of analgesics, and more negative emotions.[14]

Low morale was a significant predictor of death in the study by Garrity and Klein that assessed 48 patients for anxiety, hostility, and depression as compared with calmness and cheerfulness five days following admission to intensive coronary care. Of the 12 patients who died within six months of discharge, 10 had been characterized as suffering from unresolved emotional distress, and previous physical status did not explain the excess death rate among the depressed patients.[15]

Zheutlin and Goldstein studied 38 patients suffering major cardiac insult and reported that the combination of one Minnesota Multiphasic Personality Inventory (MMPI) scale and a cardiac status index predicted more than 70 per cent of the variance in patient recovery as assessed in a cardiac work evaluation unit.[16] Bruhn, Chandler, and Wolf found that 17 patients with myocardial infarctions who subsequently died had significantly higher MMPI depression scores than did survivors.[17]

Physician's Decision about Treatment

Kinsman, Dahlem, *et al*, have studied the patient's style of emotional response to asthma as it influences medical decisions about treatment.[6,7] Patients who scored high on a scale of "panic-fear symptomatology" tended to be kept in the hospital longer than low-scoring patients although objective measures of airway limitation did not indicate greater physiologic distress. These patients were often sent home on higher dosages of medication than were patients who had scored lower on the "panic-fear" scale. The differences in

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medication were not explainable by objectively determined physical status.[6,18] High panic-fear patients may intimidate doctors into allowing unnecessary hospitalizations. Patients extremely low on panic-fear may, in denying symptoms, seek medical care only when in acute distress and at a point when hospitalization is required.[7,19]

Patient's Response to Medical Advice

Clinicians believe that a hopeful and cooperative patient tends to have a smoother and swifter recovery than a depressed and uncooperative patient. Yet the hospital experience, as it is currently structured, may interfere actively with the patient's willingness and ability to cooperate effectively to achieve recovery. Not told what to expect next, and admonished to rely on the experts, patients and their families are disadvantaged when they strive to cooperate. Some benefits from psychologically-informed intervention in the studies to be reviewed may reflect correction of defects in the social system in which recovery and recuperation are expected to take place. Preparatory education and restructuring delivery experiences enhance the ability of obstetrical patients to cooperate with their physicians.[20,21] The literature we analyze here suggests similar benefits from emotional and social support for patients recovering from medical and surgical crisis.

Materials and Methods

Meta-Analysis of Psychological Intervention

With the help of a Medlars search (1955–1978) and subsequent pursuit of key references through the Citation Index, we located 34 controlled, experimental studies in the published and unpublished literature that tested the effects of providing psychological support as an adjunct to medically required care for patients facing surgery or recovering from heart attack.[3,4,23–55]

The term "psychological intervention" covers a wide range of activities performed by psychiatrists, psychologists, surgeons, anesthesiologists, nurses, and others intended to provide information or emotional support to patients suffering disabling illness or facing surgery. These activities range from special programs to quite simple and inexpensive modifications of, or additions to, required medical procedures.

For example, in a study of the influence of psychological preparation for surgery, the evening before surgery 25 male patients discussed their concerns and fears in a small group led by a nurse. They were told what to expect and how to aid in their own recuperation. This group was contrasted with a randomly selected control group of 25 male patients who underwent similar surgical procedures with only the routine care. The experimental patients slept better, experienced less anxiety the morning of surgery, and recalled more details but fewer fearful or unpleasant images from the day of surgery. They suffered less postoperative urinary retention, required less anesthesia and pain medication, returned more rapidly to oral intake, and were discharged sooner than the control patients.[4]

In each of the studies reviewed, the recovery of patients who received information or emotional support in preparation for surgery, or during recovery from surgery or from heart attack, was compared with that of a control group not provided the special intervention. The Appendix Table summarizes the circumstances and findings of each study with the following information:

- patients sampled
- medical or surgical problem
- nature of intervention and provider
- sampling method used in the study
- size of experimental and control groups
- description of the outcome indicators
- effect size (ES) of the outcome indicators

The effect size (ES) of the outcome indicators is a standardized measure, the average difference between the treatment and control group on the outcome variable divided by the standard deviation of the control group. The ES can be interpreted in terms of the improvement or loss that the average member of the control group would experience if given the experimental treatment. A positive ES in the Appendix tables signifies the difference favors the group receiving the psychological intervention.[22]

Results

The ESs for all 210 outcome indicators in the 34 studies average +.49; the intervention groups do better than the control groups by about one-half standard deviation. These findings are consistent across studies; only 31 (15 per cent) of the 210 outcome comparisons were negative and 8 of the negative ESs are contributed by one study.[33]

Table 1 is based only on the 180 ESs derived from well-controlled studies that reported standard deviations. We exclude measures from studies that did not either randomly assign or carefully match experimental and control patients. We also exclude measures from studies that provided neither standard deviations nor statistics that allowed for their estimation.

Table 1 analyzes the ESs within 10 outcome categories segregating psychological self-reported "pain" variables and other-rated, physiological or "medical" variables. The ESs based on external indicators are, for the most part, larger than those for the self-ratings and average +.45 compared with +.35. The highest ESs are for cooperation with treatment, speed of recovery, and fewer post-hospital complications (events). One can conclude that in general cooperation with treatment influences both speed and uneventfulness of recovery, an observation also made by Ley in his review of studies of the effects of different types of pre-operative communications on various outcome variables.[56]

The "psychological interventions" described in the Appendix Table can be categorized in terms of their intended mode of action. Some studies tested educational methods and approaches designed to provide patients with information about their conditions and what to expect. Other studies tested various psychotherapeutic approaches intended to provide reassurance, to soften irrational beliefs, or in general

TABLE 1—Average Effect Sizes within 10 Outcome Categories

	Mean	S.D.	N*
Self Ratings			
1. Pre-op. anx., pain.	+.32	.73	6
2. Post-op. anx., pain.	+.38	.59	32
$\overline{ES}$ =	+.35		
Other Rating and External Indicators			
3. Cooperation with treatment	+.60	.40	11
4. Pre- & Post-op. pain-distress (other rated)	+.44	.46	43
5. Post-op. physiological indicators	+.28	.50	25
6. Post-op. narcotics, hypnotics, etc.	+.17	.42	13
7. Speed recovery	+.80	.50	17
8. Post-op. complications	+.38	.47	13
9. Post-hosp. course (events)	+.60	.34	10
10. Days in hospital	+.25	.28	10
$\overline{ES}$ =	+.45		N = 180
Grand $\overline{ES}$ =	+.43		

* Most studies included more than one outcome indicator category.

to offer emotional support and relieve anxiety. Some studies offered interventions of both types. In the Appendix Table, reading down the third column "Nature of Experimental Group Intervention," one observes that psychotherapeutic approaches (ES +.41; s_{ES} .65; N 87) seem rather more effective than educational approaches (ES +.30; s_{ES} .51; N 56) which are also effective. A combination of both approaches seems clearly superior to either alone (ES +.65; s_{ES} .45; N 40).

A subset of the outcome indicators is particularly important for its cost implications. Thirteen studies reported 14 comparisons of the number of days hospitalized for the intervention and control groups. Ten of these studies provide adequate data for meta-analysis. The average difference in days of hospitalization for the 10 comparisons weighted equally is about two days in favor of the intervention group.* Table 2 summarizes these findings. It can be argued that studies with larger numbers of patients should be given more weight in deriving a composite. Reasoning also that a mean should be weighted inversely to its variance error, weighting each by the sample size would be appropriate. The average difference weighted for sample size and size of standard error equals 2.37 days, slightly higher than the unweighted average. Hence a reasonable estimate of the true difference between intervention and control groups favors the intervention group by more than two days.

Is this difference statistically reliable? The estimate of about two days shorter hospitalization for patients having psychological intervention is based on data from approximately 2,000 intervention and control patients across the four comparisons. Seven studies gave the standard deviation of hospital stay. The average standard deviation is 4.75 days and t = 7.32, significant at any reasonable level. If we analyze the findings using the study as the unit of analysis a significant t of 3.42 results.

We attempted to include the entire population of interest, i.e., all published and unpublished controlled experimental studies of the effects of psychological intervention in medical crisis.** One might suspect that unpublished studies would be more likely to contain negative results than would published studies. Smith attempted to study whether published studies are biased in favor of positive findings. She found that the average ES obtained by meta-analysis of data from published articles is about one-third larger than the ES from theses and dissertations that used comparable outcome indicators and subjects.[58] Two of the studies included in the Appendix Table are unpublished.[1,42] The effect sizes for one are slightly negative, for the other quite positive.

Discussion

It is important to recognize that these favorable effects prevail even though the interventions were mostly modest and not tailored to the needs of any individual patient. Since patients differ in the way they cope with emotional and physical threat, they might be expected to benefit most from interventions designed to complement their particular coping styles. The apparent superiority of providing both educational and emotional support may simply reflect increased chances of meeting the needs of more patients when two different types of intervention are offered.

A few studies offer evidence that the benefits of intervention are enhanced when the type of support provided is matched to the individual coping style of the pa-

*One study not included in the analysis reported simply "shorter stay" for patients given information compared with control patients.[57]

**After we had completed our analysis, another study was published finding a 12-day shorter hospital stay for a treatment group compared with a control group of elderly patients operated on for repair of fractured femurs. Twice as many patients in the treatment group returned home rather than to another institution.[59]

TABLE 2—Duration of Hospitalization for Intervention and Control Groups for Fourteen Studies

Author(s) Medical Problem	Intervention Group		Control Group		Difference (Δ)	Standard Error$_\Delta$*
	Average days hospitalized	N	Average days hospitalized	N		
Archuleta, Plummer & Hopkins[1] (1977) Major surgery	7.49	248	6.90	267	−.59	.43
Fortin & Kirouac[26] (1976) Major surgery	6.44	37	6.35	32	−.09	.50
Langer, Janis & Wolfer[28] (1975) Major surgery	5.64	15	7.60	15	1.96	.37
Gruen[3] (1975) Myocardial infarction	22.50	35	24.90	35	2.40	1.43
Surman, *et al*[35] (1974) Cardiac surgery	13.40	20	17.00	20	3.60	**
Schmitt and Wooldridge[4] (1973) Elective surgery	9.70	25	11.80	25	2.10	1.07
Lindeman and Stetzer[39] (1973) Elective Surgery						
Adults	6.70	90	6.65	86	−.05	.45
Children	2.11	19	3.00	11	.89	.69
Lindeman and Van Aernam[40] (1971) Major surgery	6.53	126	8.44	135	1.91	.62
DeLong[42] (1971) Abdominal Surgery	6.17	31	7.18	33	1.01	.50
Andrew[44] (1970) Hernia surgery	6.91	22	6.78	18	.13	.95
Healy[a45] (1968) Abdominal surgery	—	181	—	140	5.00	**
Egbert *et al.*[a5] (1964) Abdominal Surgery	—	51	—	46	2.70	1.06
Kolouch[b51,52] (1962, '64) Elective Surgery	6.86	197	12.40	"many thousands"	5.54	.10

* Standard Error of the difference between the means equals $S_p \times \sqrt{\frac{1}{n_i} + \frac{1}{n_c}}$ where S_p is the pooled standard deviation.
** Data insufficient to calculate Standard Error.

tient.[14,25,40,42,59] A patient who copes reasonably well with the help of denial may find detailed explanations about impending surgery or cardiac damage burdensome while another patient who copes with stress by seeking information and mastery could be reassured and helped by the same explanation.[42]

Surgical intervention or treatment on a coronary care unit may be viewed as a crisis as Whitehead defined it, "a dangerous opportunity." Analogous to the risks and benefits of medical and surgical interventions, the hospital experience itself may also be a dangerous opportunity for the patient's survival and subsequent social and emotional adjustment. The patient regaining his/her balance following a medical crisis can change direction and assume new and potentially better patterns of adaptation.[60-65] On the other hand, if the dangerous opportunity is not seized, needless incapacity may result. Survivors of heart attack range from the cardiac cripple to those whose emotional and social lives have been turned for the better.

The elaborate services provided in the surgical recovery room or the coronary care unit leave little to chance. They contrast markedly with the minimal attention systematically provided to educate patient and family for recuperation following hospitalization. In an action-oriented society, reports of the considerable effectiveness of modest interventions may command less attention than reports of the modest effects of more flamboyant interventions.

It is often argued that the medical care system cannot afford to take on the emotional status of the patient as its responsibility. Time is short and costs are high. However, it may be that medicine cannot afford to ignore the patient's emotional status assuming that it will take care of itself. Anxiety and depression do not go away by being ignored. The psychological and physiological expressions of emotional upheaval may be themselves disastrous for the delicately balanced patient or may lead to behavior that needlessly impedes recovery when surgery or medical treatment was otherwise successful.

Usually advances in medical knowledge call for large investments in training, personnel, and equipment if patients are to benefit. Thus, a measure that promises to benefit patients and to save money at the same time is newsworthy.

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APPENDIX

APPENDIX TABLE—The Effects of Psychologically-Informed Intervention on Recovery from Medical Crisis[a]

Study: Authors and Date	Patients Sampled: Medical Problem or Procedure	Nature of Experimental Group Intervention; Duration; Provider	Sampling Method: n_1 = size of experimental group[b] n_2 = size of control group[b]	Outcome Indicators	Outcome Effect Size: (ES) (+ favors Experimental Group)
Flagherty & Fitzpatrick[23] (1978)	Adults: Major surgery	Relaxation technique at 1st attempt to get out of bed, post-op. nurse	Random: $n_1 = 21$ $n_2 = 21$	a. Post-op. Demerol	+ .76
				b. Incision Pain	
				1. Intensity	+ .95
				2. Distress	+2.70
				c. Change in blood pressure	
				1. Systolic	+ .03
				2. Diastolic	− .10
				d. Change in pulse rate	+ .27
				e. Change in respiration	+ .80
Finesilver[24] (1978)	Adults: Cardiac catheterization and coronary cineangiography	Specific information and emotional support, 2 sessions: 1. At admission 2. Day before surgery; by investigator	Random: $n_1 = 20$ $n_2 = 20$	a. Medication administered during surgery[c]	+1.22
				b. Mood adjective checklist	
				1. Well-being	+ .04
				2. Happiness	+ .14
				3. Fear	+ .11
				4. Helplessness	+ .19
				5. Anger	+ .16
				c. Distress during hospitalization (nurse's rating)	+ .74
				d. Cooperation during catheterization (nurse's rating)	+ .17
				e. Post-catheterization rating by patients of how "upset" they were by procedure	+ .24
Archuleta, Plummer and Hopkins[1] (1977)	Adults: Major surgery	Preoperative teaching by nurse plus 5 min. reinforcement.	Random: $n_1 = 248$ $n_2 = 267$ In 11 hospitals	a. Days hospitalized	− .15
				b. Analgesics used	− .09
				c. Forced vital capacity	− .10
				d. Maximal midexpiratory flow	+ .02
				e. Forced expiration volume at 1 second	− .05
Felton, Huss, Payne et al.[25] (1976)	Adults: 1st time major surgery under general anesthesia	1. Preoperative information by nurse, photographs and films, average time 88 min.	Random: $n_1 = 25$ $n_2 = 25$	a. Days hospitalized[d]	—
				b. Ventilatory function	
				1. 24 hrs. post-op	+ .05
				2. 48 hrs. post-op	− .38
				3. 72 hrs. post-op.	− .25

APPENDIX TABLE—Continued

Study: Authors and Date	Patients Sampled: Medical Problem or Procedure	Nature of Experimental Group Intervention; Duration; Provider	Sampling Method: n_1 = size of experimental group[b] n_2 = size of control group[b]	Outcome Indicators	Outcome Effect Size: (ES) (+ favors Experimental Group)
				c. Heart or circulatory complications[c]	+ .60
				d. Multiple affect adjective checklist (anxiety)	+ .28
				e. Personal orientation inventory	
				1. Inner-directedness	+1.53
				2. Self-regard	+ .87
				3. Acceptance of aggression	+ .33
		2. Therapeutic communication approach by nurse, average time 62.5 min.	Random: n_1 = 12 n_2 = 25	a. Days hospitalized	0.00
				b. Ventilatory function	
				1. 24 hrs. post-op.	0.00
				2. 48 hrs. post-op.	− 0.48
				3. 72 hrs. post-op.	− .71
				c. Heart or circulatory complications	+1.45
				d. Multiple affect adjective checklist (anxiety)	+ .17
				e. Personal Orientation Inventory	
				1. Inner-directedness	0.00
				2. Self-regard	− .53
				3. Acceptance of aggression	− .85
Fortin and Kirouac[26] (1976)	Adults: Major surgery	Preoperative education and training by nurses 1 session per week starting 15–20 days before hospitalization	Random: n_1 = 37 n_2 = 32	a. Inpatient ambulatory activity	+ .43
				b. Activities of daily living	
				1. 10 days post-op.	+ .83
				2. 33 days post-op.	+ .79
				c. Days before return to work or usual level of activity	+ .42
				d. Analgesics	+ .63
				e. Absence of pain and nausea at discharge	+ .69
				f. Satisfaction with hospitalization[d]	—
				g. Days hospitalized	+ .05
				h. Days lost from work in 33 post-op. days[d] Exper. = 23.8 days Control = 26.0 days	—
				i. Readmission or death	0.00
Auerbach, Kendall, Cuttler, et al.[27] (1976)	Adults: Dental surgery	Audio-tape of specific information about surgery by dental student	Random: n_1 = 29 n_2 = 19	a. State anxiety	
				1. Immediately after intervention	− .38
				2. Immediately after surgery	+ .22
Gruen[3] (1975)	Adults: Myocardial Infarction	Eclectic Verbal: Psychiatrist, ½ hr. a day for 5–6 days "to awaken hope"	Random: n_1 = 35 n_2 = 35	a. Days hospitalized	+ .23
				b. Days in intensive care	+ .49
				c. Days on monitor	+ .36
				d. Number of patients with congestive heart failure	+ .40
				e. Congestive heart failure, days per patient	− .02
				f. Number of patients with arrythmias	+ .50
				1. Ventricular	+ .50
				2. Supraventricular	+ .85
				g. Nurse ratings	
				1. Chest pain	+ .09
				2. Other pain	− .41
				3. Depression	+ .25
				4. Anxiety	− .16
				5. Refusals of treatment	− .28
				6. Weakness, exhaustion	+ .48
				h. Physician ratings	
				1. Depression	+ .33
				2. Anxiety	− .05
				3. TMAS Bendig Score	+ .06
				4. ST Anxiety Inventory	+ .14
				5. MAACL Anxiety	+ .14
				i. Nowlis Adjective Checklist	
				1. Anxiety	+ .09

APPENDIX TABLE—Continued

Study: Authors and Date	Patients Sampled: Medical Problem or Procedure	Nature of Experimental Group Intervention; Duration; Provider	Sampling Method: n_1 = size of experimental group[b] n_2 = size of control group[b]	Outcome Indicators	Outcome Effect Size: (ES) (+ favors Experimental Group)
				2. Surgency	+ .65
				3. Elation	+ .32
				4. Affection	+ .54
				5. Sadness	+ .32
				6. Vigor	+ .30
				j. Four-month follow-up	
				1. Anxiety	+ .71
				2. Retarded activity	+ .42
Langer, Janis and Wolfer[28] (1975)	Adults: Major Surgery	Combination RET (Ellis) and learning theory (Kanfer), psychologist, 20 minutes	Random: n_1 = 15 n_2 = 15	a. Nurses' ratings	
				1. Anxiety	+ .51
				2. Ability to cope	+1.15
				b. Per cent of subjects requiring[c]	
				1. Sedatives	+ .90
				2. Pain relievers	+1.15
				c. Days hospitalized[d] Exper. = 5.64 days Control = 7.60 days	—
	Adults: Major Surgery	Preparatory information only, psychologist 20 minutes	Random: n_1 = 15 n_2 = 15	a. Nurses' ratings	
				1. Anxiety	− .62
				2. Ability to cope	− .30
				b. Per cent of subjects requiring[c]	
				1. Sedatives	+ .63
				2. Pain relievers	+ .42
				c. Days hospitalized[d] Exper. = 7.2 days Control = 7.6 days	—
Melamed and Siegel[29] (1975)	Children: Tonsils, hernia, urinary surgery	Film: "Ethan Has an Operation", 12 min.; Actors	Matched: n_1 = 30 n_2 = 30	a. Measures taken post-intervention, but immediately pre-op.	
				1. Anxiety scale of Personality Inventory for Children	+ .67
				2. Behavior Problems Checklist (not taken)	—
				3. Palmar Sweat Index	+ .75
				4. Hospital Fears Rating Scale	+ .75
				5. Observer Rating of Anxiety	+ .60
				Observer Rating of Anxiety	0.00
				Observer Rating of Anxiety	0.00
				b. Measures taken 20 days Post-op.	
				1. Anxiety Scale of Personality Inventory for Children	+ .50
				2. Behavior Problems Checklist	+ .80
				3. Palmar Sweat Index	+ .60
				4. Hospital Fears Rating Scale	+ .75
				5. Observer Rating of Anxiety	+ .60
				Observer Rating of Anxiety	0.00
				Observer Rating of Anxiety	0.00
Wolfer and Visintainer[f] [30] (1975); Visintainer and Wolfer[31] (1975)	Children: Elective surgery	"Psychologic preparation and support" by same nurse 1 hour across 6 points in time during hospitalization	Random: n_1 = 45 n_2 = 35	a. During blood test	
				1. Anxiety	+ .70
				2. Cooperation	+ .60
				b. During pre-op. medication	
				1. Anxiety	+1.32
				2. Cooperation	+1.20
				3. Pulse rate	+1.07
				c. During transport to O.R.	
				1. Anxiety	+ .52
				2. Cooperation	+ .51
				d. While in O.R.	
				1. Anxiety	+ .58
				2. Cooperation	+ .63
				e. Ease of fluid intake	+ .43
				f. Minutes to first voiding	+ .85
				g. Recovery room medication	+ .65
				h. Post-hospital adjustment	+ .90
Johnson and	Children:	Puppet therapy 1 time pre-	Random:	a. Palmar Sweat Index Change Score	

APPENDIX TABLE—Continued

Study: Authors and Date	Patients Sampled: Medical Problem or Procedure	Nature of Experimental Group Intervention; Duration; Provider	Sampling Method: n_1 = size of experimental group[b] n_2 = size of control group[b]	Outcome Indicators	Outcome Effect Size: (ES) (+ favors Experimental Group)
Stockdale[32] (1975)	Assorted surgery	operation, mean duration 13.4 min. by "The experimenter"	n_1 = 22 n_2 = 21	1. From pre-therapy to immediate post-therapy 2. From pre-therapy to night after surgery	+ .27 + .23
Rahe, O'Neil, Hagan, et al.[33] (1975)	Adults: Mycardial infarction	Four to six group therapy sessions, psychiatrist, during early rehabilitation	Mostly random, well-matched n_1 = 36 n_2 = 21	a. Number of coronary disease events 18-month follow-up post-infarction[c] 1. Coronary insufficiency 2. By-pass surgery 3. Reinfarction 4. Mortality b. Knowledge of etiological factors in heart disease	 + .61 + .63 +1.16 + .58 + .79
Field[34] (1974)	Adults: Orthopedic surgery	Hypnotherapy recording by "Research Assistant" who interviewed patient, 20 minutes plus interview	Random: n_1 = 30 n_2 = 30	a. Nervousness (rated by physician) b. Speed of recovery	+ .37 + .06
Surman, Hackett, Silverberg, et al.[35] (1974)	Adults: Cardiac surgery	One or more therapeutic interviews, including teaching of autohypnosis 60–90 minutes	Random: n_1 = 20 n_2 = 20	a. Post-op. Complications 1. Delirium 2. Cardiac failure 3. Hepatic dysfunction 4. Arrhythmias b. Post-op. Medication 1. Narcotic doses 2. Morphine units 3. Darvon doses 4. Sleep medication 5. Valium amount c. Patient's State 5 days post-op. 1. Anxiety 2. Pain 3. Depression d. Days hospitalized[d] Exper. = 13.4 days Control = 17.0 days	 + .15 − .11 + .60 0.00 − .41 − .30 − .02 − .11 + .16 − .14 − .40 − .75 —
Vernon and Bigelow[36] (1974)	Adult Males: Hernia repair surgery	Information recording re: hernia surgery and recovery heard twice pre-surgery plus encouragement to ask questions (investigator not specified)	Random: n_1 = 20 n_2 = 20	a. Pre-op. 1. Mood[c] (1) Fear (2) Worry or fear of pain 2. Patient's confidence in doctors and nurses b. Post-op. 1. Mood[c] (1) Anger (2) Depression (3) Fear 2. Confidence in doctors & nurses	 0.00 + .78 + .27 + .14 + .36 + .16 + .22
Vernon and Bailey[37] (1974)	Children: Minor elective surgery	Film showing children going through induction of anesthesia without fear, approximately 45 min. by MD investigator	Random: n_1 = 19 n_2 = 19	a. Global Mood Scale, fear rating 1. Entering operation suite 2. Entering operating room 3. First minute of surgery 4. Until surgical anesthesia level reached 5. Anesthesiologist's rating of patient's fear	 +1.11 +1.10 + .70 + .50 + .46
Schmitt and Wooldridge[4] (1973)	Adult males: Elective surgery	Nurse investigator's small group therapy session evening before surgery. 1 hour for 19 experimental subjects; and added individual 15 to 60 min. session with nurse the morning of surgery.	Random: n_1 = 25 n_2 = 25	a. Self-report of anxiety on morning of surgery b. Ability to void post-op. c. Post-op. blood pressure d. Amount of analgesics used e. Number of days to resume oral intake f. Days hospitalized post-op.	+1.73 +1.50 +1.10 + .78 + .21 + .55
Lindeman and	Adults: Elective	Pre-op. visits by operating	Random:	a. Days hospitalized	− .02

APPENDIX TABLE—Continued

Study: Authors and Date	Patients Sampled: Medical Problem or Procedure	Nature of Experimental Group Intervention; Duration; Provider	Sampling Method: n_1 = size of experimental group[b] n_2 = size of control group[b]	Outcome Indicators	Outcome Effect Size: (ES) (+ favors Experimental Group)
Stetzer[39] (1973)	surgery	room nurses; reassurance and information	$n_1 = 90$ $n_2 = 86$	b. Analgesics used within 48 hrs. post-op. c. Problems in emerging from anesthesia d. Anxiety pre-op. e. Anxiety post-op.	− .22 + .23 + .09 + .19
	Children:	Structured pre-op. teaching by nurses	Random: $n_1 = 19$ $n_2 = 11$	a. Days hospitalized b. Analgesics used within 48 hrs. post-op. c. Problems in emerging from anesthesia d. Anxiety pre-op. e. Anxiety post-op.	+ .30 + .56 + .36 + .21 + .46
Lindeman and Van Aernam[40] (1971)	Adults: Chest and abdominal surgery	Structured pre-op. teaching by nurses	Random: $n_1 = 126$ $n_2 = 135$	a. Days hospitalized b. Analgesics used within 48 hrs. post-op. c. Maximal expiratory flow rate d. Vital capacity e. One second forced expiratory volume	+ .34 − .02 + .47 + .35 + .35
Aiken and Henrichs[41] (1971)	Adult males: Heart surgery	Modified systematic desensitization (Wolpe and Lazarus) Nurses, plus 15 min. tape recorded relaxation exercise	Matched: $n_1 = 15$ $n_2 = 15$	a. Psychosis post-op. b. Anesthesia time c. Units of blood d. Degrees of hypothermia e. Duration of hypothermia f. Mortality (3/15 = 3/15) g. Minutes on bypass machine	+ .87 + .72 +1.00 +1.03 + .62 0.00 +1.41
DeLong[42] (1971)	Adults, female: Elective abdominal surgery	Specific information about condition, surgery and recovery given by psychologist	Random: $n_1 = 31$ $n_2 = 33$	a. Days hospitalized b. Physical recovery	+ .54 + .65
Layne and Yudofsky[e] [43] (1971)	Adults: Intracardiac surgery	Therapeutic interview evening before surgery	Sample of convenience: $n_1 = 42$ $n_2 = 19$	a. Psychosis post-op.[c] Exper. = 10% Control = 22%	+ .51
Andrew[e] [44] (1970)	Adult males: Hernia surgery	Informational tape recording, 8 minutes, by psychologist	Sampling method unclear: $n_1 = 22$ $n_2 = 18$	a. Days hospitalized b. Amount of medication	− .04 + .11
Healy[e] [45] (1968)	Adults: Abdominal surgery	Preparation for post-surgical experience, by nurse	Sampling method unclear: $n_1 = 181$ $n_2 = 140$	a. "Discharge earlier than norm"[cg] b. Narcotics required[d] c. Post-surgical complications	+3.28 — + .92
Lazarus and Hagens[e] [46] (1968)	Adults: Open-heart surgery	Interview 1 hr. plus consultation with staff and changes in recovery room procedures	Sample of convenience: groups in two different hospitals $n_1 = 21$ $n_2 = 33$	a. Per cent patients with psychosis post-op.[c]	+ .65
Cassell[47] (1965); Cassell and Paul[h] [48] (1967)	Children: Cardiac catheterization	Puppet therapy before and after catheterization; child clinical psychologist.	Random: $n_1 = 20$ $n_2 = 20$	a. Disturbance during catheterization b. Willingness to return to hospital 1. 3 days post-op. 2. 30 days post-op. c. Behavior adjustment post-hosp. 1. 3 days 2. 30 days d. Days 1 and 3 observation 1. Mood 2. Anxiety 3. Anxiety	+ .82 + .08 + .23 + .08 + .05 + .40 + .36 + .86
Mahaffy[f] [49] (1965)	Children: Tonsilectomy and ad-	Information and support to mothers by nurse at admis-	Random: $n_1 = 21$	a. Post-op. 1. Ability to take fluids orally	 +1.95

APPENDIX TABLE—Continued

Study: Authors and Date	Patients Sampled: Medical Problem or Procedure	Nature of Experimental Group Intervention; Duration; Provider	Sampling Method: n_1 = size of experimental group[b] n_2 = size of control group[b]	Outcome Indicators	Outcome Effect Size: (ES) (+ favors Experimental Group)
	noidectomy	sion and when child returns from recovery room.	n_2 = 22	2. Vomiting	+1.12
				3. Crying before bedtime	+1.01
				4. Crying after bedtime	+ .90
				b. Post-hospital Questionnaire	
				1. Fever	+ .84
				2. Called doctor to home	+ .52
				3. How long before child "recovered"	+ .79
				4. Child's behavior worries mother	+ .83
				5. Child's sleep disturbed	+1.31
				6. Fear of doctors and nurses	+ .36
				7. Fear of leaving mother	+ .28
				8. Crying	+ .30
Dumas and Leonard[e] [50] (1963)	Adult females: Gynecologic surgery	Nurse visited one hour before surgery, accompanied patient to surgery and remained until the patient was on OR table.	Unspecified: n_1 = 31 n_2 = 31 Total over 3 experiments	a. Post-op. vomiting[c]	+1.10
Kolouch[e] [51,52] (1962, 1964)	Adults: Elective surgery	Hypnotherapy prior to surgery and suggestion while patient still under anesthesia; by surgeon investigator.	Sampling method unclear: 100 cases selected by experimenter	a. Post-operative analgesics[d]	—
				b. Days hospitalized[i]	+ .70
Egbert, Battit, Welch, et al.[5] (1964)	Adults: Abdominal surgery	Information and reassurance by the anesthesiologist night before surgery plus visit by the same anesthesiologist post-surgery	Random: n_1 = 51 n_2 = 46	a. Amount post-op. morphine[j]	+ .51
				b. Amount of pain[j]	+ .40
				c. Days hospitalized	+ .67
Bonilla, Quigley and Bowers[e] [53] (1961)	Adult males: Knee surgery	Hypnotherapy pre-surgery by operating surgeon, 100 minutes total except for post-surgical hypnotism needed for 2 patients	Consecutive cases for each group: n_1 = 9 n_2 = 40	a. Average rehabilitation time[k]	+1.31
				b. Post-op. narcotic[d]	—
Vaughan[e] [54] (1957)	Children: Strabismus surgery	Reassurance and explanations by surgeon on admission for 15–25 minutes, repeat visits by surgeon 3rd and 5th days post-op., for 10–15 min.	Matched: n_1 = 20 n_2 = 20	a. Disturbed behavior[c]	
				1. Immediate post-op.	+ .37
				2. 7 days post-op.	+ .90
				3. 26 weeks post-op.	+1.15
Goldie[e] [55] (1956)	Adults and Children: Requiring surgery or orthopedic procedure in ER	Hypnosis treatment as adjunct to or substitute for anesthesia; the physician handling the patient.	Sample of convenience: n_1 = 210 n_1 = 178	a. Administration of general or local anesthetic for[c]	
				1. Incisions	+ .31
				2. Removal of foreign body	+ .89
				3. Suturing	+ .47
				4. Reducing fracture or dislocation	+1.34

FOOTNOTES TO APPENDIX TABLE

[a]Some authors published more than one article about the same studies and from these, only non-duplicated findings are reported. Studies that tested the effect of emotional support for a mother on recovery of child-patient were included. Studies that tested the effect of support for a mother of a child-patient on the subsequent comfort of the mother were not included.

[b]The group sizes for some studies change slightly for different outcome variables.

[c]Values transformed from percentages to metric numbers by probit transformation.

[d]Means and standard deviations needed to compute ES not available in published study.

[e]These ESs are derived from studies that did not assign patients to experimental and control groups randomly or through adequate matching or are approximated through probit transformation. They are excluded from the analysis reported in Table 2.

[f]Only the outcome variables listed were reported in sufficient detail to permit computing ES.

[g]This largest ES for hospital stay was computed from probit transformed dichotomous data. The author does not describe how the "norm" for expected hospital stay was determined. The analysis reported in Table 2 omits this finding.

[h]Three outcome measures relating to recall of surgery are omitted. The ESs are large and favor the intervention group but the benefit of recall is uncertain. The same findings are reported in Cassell's study.[47]

[i]Author reports findings for five types of surgery but data are sufficient to permit computing ES for only two—hernia and thyroid. We present the average ES for these two as a conservative estimate of the effects obtained.

[j]Authors report 24-hour morphine usage for five post-op. days and four measures of post-op. pain. Since the ESs are quite similar and redundant, we substitute the average ES for each set. The S.D.s needed to compute the ESs could be estimated from the data presented.

[k]S.D. could be estimated from other data to compute ES.